

ARTIFACT SHEET

Enter artifact number below. Artifact number is application number + artifact type code (see list below) + sequential letter (A, B, C . . .). The first artifact folder for an artifact type receives the letter A, the second B, etc..
Examples: 59123456PA, 59123456PB, 59123456ZA, 59123456ZB

591640794 BA
Indicate quantity of a single type of artifact received but not scanned. Create individual artifact folder/box and artifact number for each Artifact Type.

☐

CD(s) containing:

computer program listing

Doc Code: Computer

pages of specification

and/or sequence listing

and/or table

Doc Code: Artifact

content unspecified or combined

Doc Code: Artifact

☐

Artifact Type Code: P

☐

Artifact Type Code: S

☐

Artifact Type Code: U

☐

Stapled Set(s) Color Documents or B/W Photographs

Doc Code: Artifact Artifact Type Code: C

☐

Microfilm(s)

Doc Code: Artifact Artifact Type Code: F

☐

Video tape(s)

Doc Code: Artifact Artifact Type Code: V

☐

Model(s)

Doc Code: Artifact Artifact Type Code: M

☒

Bound Document(s)

Doc Code: Artifact Artifact Type Code: B

☐

Confidential Information Disclosure Statement or Other Documents marked Proprietary, Trade Secrets, Subject to Protective Order, Material Submitted under MPEP 724.02, etc.

Doc Code: Artifact Artifact Type Code X

☐

Other, description: _____

Doc Code: Artifact Artifact Type Code: Z



The United States of America



The Commissioner of Patents and Trademarks

Has received an application for a patent for a new and useful invention. The title and description of the invention are enclosed. The requirements of law have been complied with, and it has been determined that a patent on the invention shall be granted under the law.

Therefore, this

United States Patent

Grants to the person(s) having title to this patent the right to exclude others from making, using, offering for sale, or selling the invention throughout the United States of America or importing the invention into the United States of America for the term set forth below, subject to the payment of maintenance fees as provided by law.

If this application was filed prior to June 8, 1995, the term of this patent is the longer of seventeen years from the date of grant of this patent or twenty years from the earliest effective U.S. filing date of the application, subject to any statutory extension.

If this application was filed on or after June 8, 1995, the term of this patent is twenty years from the U.S. filing date, subject to any statutory extension. If the application contains a specific reference to an earlier filed application or applications under 35 U.S.C. 120, 121 or 365(c), the term of the patent is twenty years from the date on which the earliest application was filed, subject to any statutory extension.

J. Todd Pichman

Acting Commissioner of Patents and Trademarks

Ellie M. Person
Attest

RECEIVED

JUL 01 2002

GROUP 3600



US005907395A

United States Patent [19]

Schulz et al.

[11] Patent Number: 5,907,395

[45] Date of Patent: May 25, 1999

[54] OPTICAL FIBER PROBE FOR POSITION MEASUREMENT

[75] Inventors: Waldean A. Schulz; Ivan Faul;
Ronald M. Pasquini, all of Boulder;
Daniel J. Harrison, Nederland, all of
Colo.

[73] Assignee: Image Guided Technologies, Inc.,
Boulder, Colo.

[21] Appl. No.: 08/870,296

[22] Filed: Jun. 6, 1997

[51] Int. Cl.⁶ G01B 11/26; A61B 19/00

[52] U.S. Cl. 356/139.03; 356/141.5;
356/375; 600/476; 606/130

[58] Field of Search 356/139.03, 141.3,
356/141.5, 375; 600/476; 606/130

[56] References Cited

U.S. PATENT DOCUMENTS

4,099,879	7/1978	Britz	356/141
4,193,689	3/1980	Reymond et al.	356/152
4,209,254	6/1980	Reymond et al.	356/152
4,836,788	6/1989	Kato	437/17
4,896,673	1/1990	Rose et al.	128/660.03
5,047,776	9/1991	Baller	342/52
5,198,877	3/1993	Schulz	356/375
5,279,309	1/1994	Taylor et al.	128/782
5,622,170	4/1997	Schulz	128/653.1

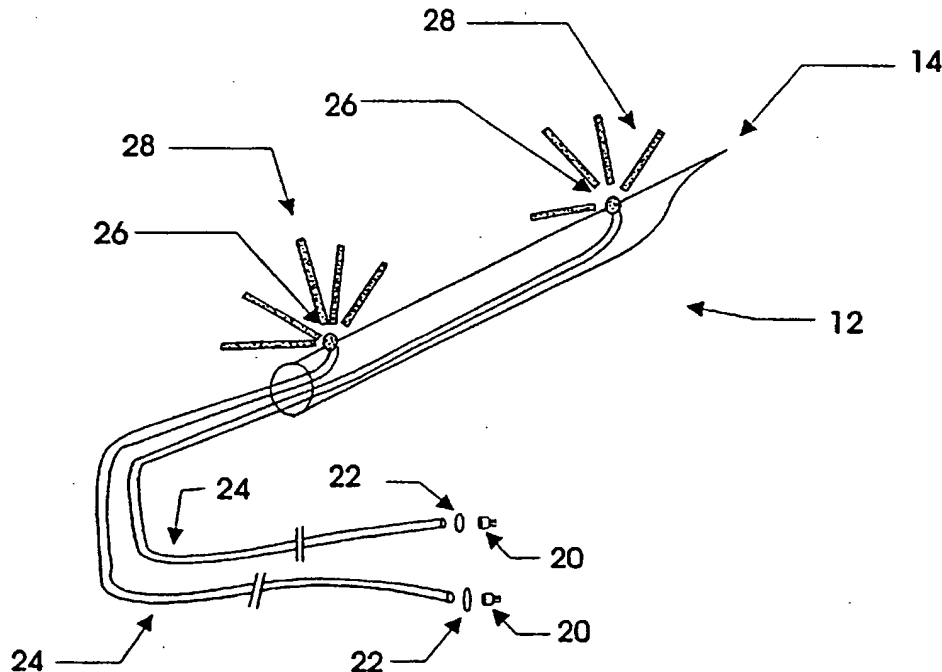
Primary Examiner—Mark Hellner

Attorney, Agent, or Firm—Lowe Hauptman Gopstein
Gilman & Berner

[57] ABSTRACT

Improved point source electromagnetic radiation emitters including a dispersing element that radiates electromagnetic radiation over a very wide conical angle of approaching about 180°. This light dispersing element can be in any one or more of several illustrated forms such as a light diffusing spherical or hemispherical element, a planar diffusing plate, a tapered light guide, a plano-concave lens, a convex mirror, a light pipe with a large numerical aperture, or the like. The emitter of this invention may be fixed to an object and tracked in a 3-dimensional volume by a system using electro-optical position sensors in order to determine the spatial location of the emitters and therefore to determine, by geometry, the position and orientation of the object. The electromagnetic radiation generator is preferably disposed remote from the emitter and is electrically and magnetically isolated from the emitter. A common optical fiber provides transmission of the radiation from the generator to the emitter. The emitted radiation more nearly resembles point source of radiation and therefore enables more accurate determination of the location of the radiating element, and thereby more accurate determination of the position and orientation of the object on which the emitters reside. The preferred electromagnetic radiation generator is an LED, most preferably a laser diode.

48 Claims, 5 Drawing Sheets



ice fees
and six
r upon
nainte-
licable
the fee
end of